Pearson Edexcel

AEA Mathematics

Specification

Pearson Edexcel Advanced Extension Award in Mathematics

First teaching from September 2017

First certification from 2019

Issue 2

Summary of Pearson Edexcel Advcanced Extension Award in Mathematics Specification Issue 2 changes

Summary of changes made between previous issue and this current issue	Page number
The following text has been added to the *Qualification at a glance* section underneath *Content and Assessment Overview*: The total number of guided learning hours (GLH) for this qualification is 360. The total number of hours a learner is expected to take to complete the qualification to the required standard (TQT) is 360.	3

Earlier issue(s) show(s) previous changes.

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

Contents

1 Introduction

Why choose the Pearson Edexcel Advanced Extension Award in Mathematics?

We have listened to feedback from all parts of the mathematics subject community, including higher education. We have used this opportunity of curriculum change to redesign a qualification that reflects the demands of a wide variety of end users, as well as retaining many of the features that have contributed to the increasing popularity of GCE Mathematics in recent years.

We provide the following.

- **A simple, intuitive specification**, with the same content as GCE Advanced Level in Mathematics, so that there is no new content to teach students who want to take this Pearson Edexcel Advanced Extension Award (AEA) in Mathematics.
- **Clear, familiar examinations** – the Advanced Extension Award (AEA) exams are necessarily demanding but with the assessment approach staying the same, exams will follow a similar format to legacy AEA papers.
- **Exam practice** to fully prepare students for examinations. Although the content is the same as the GCE Advanced Level in Mathematics, the assessment is significantly different, so some practice to prepare for the exam is essential. With the style of the assessment not changing, the legacy AEA papers remain a valuable resource. Papers are available on our website and the Maths Emporium website on mathsemporium@pearson.com that go back to 2002.
- **Complete support and free materials** to help you understand and deliver the qualification. Although the AEA does not have its own dedicated support package, the support available for GCE Advanced Level in Mathematics is also relevant for the AEA. Whether it is through our collaborative network events or via the renowned Maths Emporium, we will be available face to face, online or over the phone throughout the lifetime of the qualification. We will also give you free materials such as schemes of work, topic tests and progression maps.

The published resources you know and trust – Although there are no published resources specific to the AEA, our A Level Mathematics textbooks retain all the features you know and love about the current series, while being fully updated to match the 2017 A Level specifications. Each textbook comes packed with additional online content that supports independent learning. All the textbooks tie in with our free qualification support, giving you the most coherent approach to teaching and learning.

Supporting you in planning and implementing this qualification

The Pearson Edexcel Advanced Extension Award (AEA) in Mathematics does not have its own support package but with the same content as the GCE Advanced Level in Mathematics, much of the GCE Advanced Level support is relevant to the AEA. The information given below applies to both the GCE Advanced Level and the AEA.

Planning

- Our ***Getting Started*** guide gives you an overview of the new AS and A Level qualifications to help you to get to grips with the changes to content and assessment and to help you understand what these changes mean for you and your students.
- We will give you an editable **course planner** and **scheme of work** that you can adapt to suit your department.
- **Our mapping documents** highlight key differences between the new and 2008 qualifications.

Teaching and learning

There will be lots of free teaching and learning support to help you deliver the new qualifications, including:

- topic guides covering new content areas
- teaching support for problem solving.

Preparing for exams

We will provide a range of resources to help you prepare your students for the assessments, including:

- past papers
- marked exemplars of student work with examiner commentaries.

ResultsPlus

ResultsPlus provides the most detailed analysis available for your students' exam performance. It can help you identify the topics and skills where further learning would benefit your students. The AEA in mathematics will be available on ResultsPlus from summer 2020.

Get help and support

Mathematics Emporium – support whenever you need it

The renowned Mathematics Emporium helps you keep up to date with all areas of maths throughout the year, as well as offering a rich source of past questions and, of course, access to our in-house maths expert, Graham Cumming, and his team.

Sign up to get Emporium emails

Get updates on the latest news, support resources, training and alerts for entry deadlines and key dates direct to your inbox. Just email mathsemporium@pearson.com to sign up.

Emporium website

Over 12 000 documents relating to past and present Pearson Edexcel mathematics qualifications are available free of charge. Please visit www.edexcelmaths.com to register for an account.

Qualification at a glance

Content and assessment overview

The Pearson Edexcel Advanced Extension Award in Mathematics has **one** externally-examined examination paper.

Students must complete the assessment in May/June in every year.

The total number of guided learning hours (GLH) for this qualification is 360.

The total number of hours a learner is expected to take to complete the qualification to the required standard (TQT) is 360.

Paper 1: Mathematics (*Paper code: 9811/01)
Written examination: 3 hours ***100% of the qualification*** ***100 marks***
Content overview The content of the Pearson Edexcel Advanced Extension Award in Mathematics is examined on the same content as the GCE Advanced Level in Mathematics. **Pure Mathematics** • Topic 1 – Proof • Topic 2 – Algebra and functions • Topic 3 – Coordinate geometry in the (x, y) plane • Topic 4 – Sequences and series • Topic 5 – Trigonometry • Topic 6 – Exponentials and logarithms • Topic 7 – Differentiation • Topic 8 – Integration • Topic 9 – Numerical methods • Topic 10 – Vectors **Mechanics and Statistics** • Topic 1 – Statistical sampling • Topic 2 – Data presentation and interpretation • Topic 3 – Probability • Topic 4 – Statistical distributions • Topic 5 – Statistical hypothesis testing • Topic 6 – Quantities and units in mechanics • Topic 7 – Kinematics • Topic 8 – Forces and Newton's laws • Topic 9 – Moments
Assessment overview • Paper 1 may contain questions on any topic from GCE Advanced Level in Mathematics. • Seven marks allocated to style and clarity of presentation. • Students must answer all questions. • Calculators must not be used in the assessment.

*The subject code is used by centres to enter students for a qualification. Centres will need to use the entry codes only when claiming students' qualifications.

2 Subject content and assessment information

Qualification aims and objectives

The aims and learning objectives for this qualification are to:

- challenge the most able advanced level students by giving them opportunities to demonstrate a greater depth of understanding, analysis, evaluation and problem solving than that required at GCE Advanced level with no additional study or learning required
- be accessible to all able students studying for GCE Advanced Level in Mathematics.
- help differentiate between the most able students, particularly in subjects with a high proportion of A grades at GCE Advanced Level in Mathematics, in order to obviate the need for universities to develop their own entry tests.

Overarching themes

The overarching themes for the Pearson Edexcel Advanced Extension Award in Mathematics replicate those in the Pearson Edexcel Level 3 GCE Advanced Level in Mathematics specification.

Content

The content of the Pearson Edexcel Advanced Extension Award in Mathematics is examined on the same content as the GCE Advanced Level in Mathematics. This content is given in the Pearson Edexcel Level 3 GCE Advanced in Mathematics specification.

Formulae and notation

Students must be able to recall the mathematical formulae and identities set out in Pearson Edexcel Level 3 Advanced Subsidiary and Advanced GCE Mathematics and Further Mathematics formulae booklet *Mathematical formulae and statistical tables*. Students must use the mathematical notation set out in the Pearson Edexcel Level 3 GCE Advanced Level in Mathematics specification.

Style and clarity of presentation marks

The style and clarity of presentation marks will be awarded as indicated in the mark scheme given in the *Pearson Edexcel Advanced Extension Award in Mathematics Sample Assessment Materials (SAMs)* document (ISBN 9781446959923). These are denoted as 'S' marks and will be awarded for clear, elegant and succinct complete solutions to questions. There will be clear indicators in the mark scheme as to where S marks will be awarded.

Assessment information

- First assessment is May/June 2019.
- One external assessment.
- The duration of the assessment is 3 hours.
- The assessment is out of 100 marks.
- Seven marks are allocated to style and clarity of presentation.
- Students must answer all questions.
- Calculators must not be used in the assessment.
- Students must use the Pearson Edexcel Level 3 Advanced Subsidiary and Advanced GCE Mathematics and Further Mathematics formulae booklet *Mathematical formulae and statistical tables*.
- Students will be given an insert of questions where there are more than four response pages for a question. This is to ensure that students use the allocated time appropriately.

Synoptic assessment

Synoptic assessment requires students to show their accumulated knowledge and understanding of a topic or subject area.

Synoptic assessment enables students to show their ability to combine their skills, knowledge and understanding with breadth and depth of the subject.

This paper assesses synopticity.

Sample assessment materials

A sample paper and mark scheme for this paper is given in the *Pearson Edexcel Advanced Extension Award in Mathematics Sample Assessment Materials (SAMs)* document (ISBN 9781446959923).

Assessment Objectives

Students must:		% in AEA
AO1	**Use and apply standard techniques** Students should be able to: • select and correctly carry out routine procedures; and • accurately recall facts, terminology and definitions.	20–30
AO2	**Reason, interpret and communicate mathematically** Students should be able to: • construct rigorous mathematical arguments (including proofs) • make deductions and inferences • assess the validity of mathematical arguments • explain their reasoning; and • use mathematical language and notation correctly. *Where questions/tasks targeting this Assessment Objective will also credit candidates for the ability to 'use and apply standard techniques' (AO1) and/or to 'solve problems within mathematics and in other contexts' (AO3), an appropriate proportion of the marks for the question/task must be attributed to the corresponding Assessment Objective(s).*	30–40
AO3	**Solve problems within mathematics and in other contexts** Students should be able to: • translate problems in mathematical and non-mathematical contexts into mathematical processes • interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations • translate situations in context into mathematical models • use mathematical models; and • evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them. *Where questions/tasks targeting this Assessment Objective will also credit candidates for the ability to 'use and apply standard techniques' (AO1) and/or to 'reason, interpret and communicate mathematically' (AO2), an appropriate proportion of the marks for the question/task must be attributed to the corresponding Assessment Objective(s).*	35–45
	Total	**100%**

Breakdown of Assessment Objectives

Paper	Assessment Objectives			Total for all Assessment Objectives
	AO1	AO2	AO3	
Paper 1	20–30	30–40	35–45	100%
Total for AEA	**20–30%**	**30–40%**	**35–45%**	**100%**

3 Administration and general information

Entries

Details of how to enter students for the examinations for this qualification can be found in our *UK Information Manual*. A copy is made available to all examinations officers and it is also available on our website: qualifications.pearson.com

Discount code and performance tables

Centres should be aware that students who enter for more than one Advanced Level GCE qualification with the same discount code will have only one of the grades they achieve counted for the purpose of the school and college performance tables. This will be the grade for the larger qualification (i.e. the A Level grade rather than the AS grade). If the qualifications are the same size, then the better grade will be counted.

Please note that there are two codes for AS GCE qualifications; one for Key Stage 4 (KS4) performance tables and one for 16–19 performance tables. If a KS4 student achieves both a GCSE and an AS with the same discount code, the AS result will be counted over the GCSE result.

Students should be advised that if they take two GCE qualifications with the same discount code, the colleges, universities and employers to which they wish to progress are likely to take the view that this achievement is equivalent to only one GCE. The same view may be taken if students take two GCE qualifications that have different discount codes but which have significant overlap of content. Before embarking on their programmes, students or their advisers who have any doubts about their subject combinations should check with the institution to which they wish to progress.

Access arrangements, reasonable adjustments, special consideration and malpractice

Equality and fairness are central to our work. Our equality policy requires all students to have equal opportunity to access our qualifications and assessments, and our qualifications to be awarded in a way that is fair to every student.

We are committed to making sure that:

- students with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to students who do not share that characteristic
- all students achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Language of assessment

Assessment of this qualification will be available in English. All student work must be in English.

Access arrangements

Access arrangements are agreed before an assessment. They allow students with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

The intention behind an access arrangement is to meet the particular needs of an individual student with a disability, without affecting the integrity of the assessment. Access arrangements are the principal way in which awarding bodies comply with the duty under the Equality Act 2010 to make 'reasonable adjustments'.

Access arrangements should always be processed at the start of the course. Students will then know what is available and have the access arrangement(s) in place for assessment.

Reasonable adjustments

The Equality Act 2010 requires an awarding organisation to make reasonable adjustments where a person with a disability would be at a substantial disadvantage in undertaking an assessment. The awarding organisation is required to take reasonable steps to overcome that disadvantage.

A reasonable adjustment for a particular person may be unique to that individual and therefore might not be in the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, including:

- the needs of the student with the disability
- the effectiveness of the adjustment
- the cost of the adjustment; and
- the likely impact of the adjustment on the student with the disability and other students.

An adjustment will not be approved if it involves unreasonable costs to the awarding organisation, or affects timeframes or the security or integrity of the assessment. This is because the adjustment is not 'reasonable'.

Special consideration

Special consideration is a post-examination adjustment to a student's mark or grade to reflect temporary injury, illness or other indisposition at the time of the examination/ assessment, which has had, or is reasonably likely to have had, a material effect on a candidate's ability to take an assessment or demonstrate their level of attainment in an assessment.

Further information

Please see our website for further information about how to apply for access arrangements and special consideration.

For further information about access arrangements, reasonable adjustments and special consideration, please refer to the JCQ website: www.jcq.org.uk.

Candidate malpractice

Candidate malpractice refers to any act by a candidate that compromises or seeks to compromise the process of assessment or which undermines the integrity of the qualifications or the validity of results/certificates.

Candidate malpractice found in controlled assessments after the declaration of authenticity has been signed, and in examinations **must** be reported to Pearson on a *JCQ Form M1* (available at www.jcq.org.uk/exams-office/malpractice). The completed form can be emailed to pqsmalpractice@pearson.com or posted to Investigations Team, Pearson, 190 High Holborn, London, WC1V 7BH. Please provide as much information and supporting documentation as possible. Note that the final decision regarding appropriate sanctions lies with Pearson.

Failure to report candidate malpractice constitutes staff or centre malpractice.

Staff/centre malpractice

Staff and centre malpractice includes both deliberate malpractice and maladministration of our qualifications. As with candidate malpractice, staff and centre malpractice is any act that compromises or seeks to compromise the process of assessment or undermines the integrity of the qualifications or the validity of results/certificates.

All cases of suspected staff malpractice and maladministration **must** be reported immediately, before any investigation is undertaken by the centre, to Pearson on a *JCQ Form M2(a)* (available at www.jcq.org.uk/exams-office/malpractice). The form, supporting documentation and as much information as possible can be emailed to pqsmalpractice@pearson.com or posted to Investigations Team, Pearson, 190 High Holborn, London, WC1V 7BH. Note that the final decision regarding appropriate sanctions lies with Pearson.

Failure to report malpractice itself constitutes malpractice.

More detailed guidance on malpractice can be found in the latest version of the document *General and Vocational Qualifications Suspected Malpractice in Examinations and Assessments Policies and Procedures,* available at www.jcq.org.uk/exams-office/malpractice.

Awarding and reporting

This qualification will be graded, awarded and certificated to comply with the requirements of Ofqual's General Conditions of Recognition.

This qualification will be graded and certificated on a two-grade scale, which will be Merit and Distinction, using the total subject mark.

Students whose level of achievement is below the minimum judged by Pearson to be of sufficient standard to be recorded on a certificate will receive an unclassified U result.

The first certification opportunity for this qualification will be 2019.

Student recruitment and progression

Pearson follows the JCQ policy concerning recruitment to our qualifications in that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

Prior learning and other requirements

There are no prior learning or other requirements for this qualification.

Students who would benefit most from studying this qualification are likely to have a Level 2 qualification such as a GCSE in Mathematics.

Progression

Students can progress from this qualification to:

- a range of different, relevant academic or vocational higher education qualifications
- employment in a relevant sector
- further training.

Appendices

Appendix 1: The context for the development of this qualification

All our qualifications are designed to meet our World Class Qualification Principles[1] and our ambition to put the student at the heart of everything we do.

We have developed and designed this qualification by:

- reviewing other curricula and qualifications to ensure that it is comparable with those taken in high-performing jurisdictions overseas
- consulting with key stakeholders on content and assessment, including learned bodies, subject associations, higher-education academics, teachers and employers to ensure this qualification is suitable for a UK context
- reviewing the legacy qualification and building on its positive attributes.

This qualification has been developed to meet criteria stipulated by Ofqual in their documents *AEA Qualification Level Conditions and Requirements* and *AEA Qualification Level Guidance*, published in June 2018.

[1] Pearson's World Class Qualification Principles ensure that our qualifications are:

- **demanding**, through internationally benchmarked standards, encouraging deep learning and measuring higher-order skills
- **rigorous**, through setting and maintaining standards over time, developing reliable and valid assessment tasks and processes, and generating confidence in end users of the knowledge, skills and competencies of certified students
- **inclusive**, through conceptualising learning as continuous, recognising that students develop at different rates and have different learning needs, and focusing on progression
- **empowering**, through promoting the development of transferable skills, see *Appendix 2*.

From Pearson's Expert Panel for World Class Qualifications

May 2014

" The reform of the qualifications system in England is a profoundly important change to the education system. Teachers need to know that the new qualifications will assist them in helping their learners make progress in their lives.

When these changes were first proposed we were approached by Pearson to join an 'Expert Panel' that would advise them on the development of the new qualifications.

We were chosen, either because of our expertise in the UK education system, or because of our experience in reforming qualifications in other systems around the world as diverse as Singapore, Hong Kong, Australia and a number of countries across Europe.

We have guided Pearson through what we judge to be a rigorous qualification development process that has included:

- extensive international comparability of subject content against the highest-performing jurisdictions in the world
- benchmarking assessments against UK and overseas providers to ensure that they are at the right level of demand
- establishing External Subject Advisory Groups, drawing on independent subject-specific expertise to challenge and validate our qualifications
- subjecting the final qualifications to scrutiny against the DfE content and Ofqual accreditation criteria in advance of submission.

Importantly, we have worked to ensure that the content and learning is future oriented. The design has been guided by what is called an 'Efficacy Framework', meaning learner outcomes have been at the heart of this development throughout.

We understand that ultimately it is excellent teaching that is the key factor to a learner's success in education. As a result of our work as a panel we are confident that we have supported the development of qualifications that are outstanding for their coherence, thoroughness and attention to detail and can be regarded as representing world-class best practice. "

Sir Michael Barber (Chair)

Chief Education Advisor, Pearson plc

Bahram Bekhradnia

President, Higher Education Policy Institute

Dame Sally Coates

Principal, Burlington Danes Academy

Professor Robin Coningham

Pro-Vice Chancellor, University of Durham

Dr Peter Hill

Former Chief Executive ACARA

Professor Lee Sing Kong

Director, National Institute of Education, Singapore

Professor Jonathan Osborne

Stanford University

Professor Dr Ursula Renold

Federal Institute of Technology, Switzerland

Professor Bob Schwartz

Harvard Graduate School of Education

All titles correct as at May 2014

Appendix 2: Transferable skills

The need for transferable skills

In recent years, higher education institutions and employers have consistently flagged the need for students to develop a range of transferable skills to enable them to respond with confidence to the demands of undergraduate study and the world of work.

The Organisation for Economic Co-operation and Development (OECD) defines skills, or competencies, as 'the bundle of knowledge, attributes and capacities that can be learned and that enable individuals to successfully and consistently perform an activity or task and can be built upon and extended through learning.' [1]

To support the design of our qualifications, the Pearson Research Team selected and evaluated seven global 21st-century skills frameworks. Following on from this process, we identified the National Research Council's (NRC) framework as the most evidence-based and robust skills framework. We adapted the framework slightly to include the Program for International Student Assessment (PISA) ICT Literacy and Collaborative Problem Solving (CPS) Skills.

The adapted National Research Council's framework of skills involves: [2]

Cognitive skills

- **Non-routine problem solving** – expert thinking, metacognition, creativity.
- **Systems thinking** – decision making and reasoning.
- **Critical thinking** – definitions of critical thinking are broad and usually involve general cognitive skills such as analysing, synthesising and reasoning skills.
- **ICT literacy** – access, manage, integrate, evaluate, construct and communicate. [3]

Interpersonal skills

- **Communication** – active listening, oral communication, written communication, assertive communication and non-verbal communication.
- **Relationship-building skills** – teamwork, trust, intercultural sensitivity, service orientation, self-presentation, social influence, conflict resolution and negotiation.
- **Collaborative problem solving** – establishing and maintaining shared understanding, taking appropriate action, establishing and maintaining team organisation.

Intrapersonal skills

- **Adaptability** – ability and willingness to cope with the uncertain, handling work stress, adapting to different personalities, communication styles and cultures, and physical adaptability to various indoor and outdoor work environments.
- **Self-management and self-development** – ability to work remotely in virtual teams, work autonomously, be self-motivating and self-monitoring, willing and able to acquire new information and skills related to work.

Transferable skills enable young people to face the demands of further and higher education, as well as the demands of the workplace, and are important in the teaching and learning of this qualification. We will provide teaching and learning materials, developed with stakeholders, to support our qualifications.

---

[1] OECD – *Better Skills, Better Jobs, Better Lives* (OECD Publishing, 2012)

[2] Koenig J A, National Research Council – *Assessing 21st Century Skills: Summary of a Workshop* (National Academies Press, 2011)

[3] PISA – *The PISA Framework for Assessment of ICT Literacy* (2011)

Appendix 3: Codes

Type of code	Use of code	Code
Discount codes	Every qualification eligible for performance tables is assigned a discount code indicating the subject area to which it belongs. Discount codes are published by DfE in the RAISE online library (www.raiseonline.org)	2210
Regulated Qualifications Framework (RQF) codes	Each qualification title is allocated an Ofqual Regulated Qualifications Framework (RQF) code. The RQF code is known as a Qualification Number (QN). This is the code that features in the DfE Section 96 and on the LARA as being eligible for 16–18 and 19+ funding, and is to be used for all qualification funding purposes. The QN will appear on students' final certification documentation.	The QN for this qualification is: 603/3914/7
Subject codes	The subject code is used by centres to enter students for a qualification. Centres will need to use the entry codes only when claiming students' qualifications.	9811
Paper codes	These codes are provided for reference purposes. Students do not need to be entered for individual papers.	Paper 1: 9811/01

DB130623 GQ000038_AEA_MATHEMATICS_ISSUE 2.DOCX.1-24/0

About Pearson

We are the world's leading learning company operating in countries all around the world.
We provide content, assessment and digital services to learners, educational institutions, employers, governments and other partners globally. We are committed to helping equip learners with the skills they need to enhance their employability prospects and to succeed in the changing world of work. We believe that wherever learning flourishes so do people.

References to third party materials made in this specification are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Materials may include textbooks, journals, magazines and other publications and websites.)

All information in this specification is correct at time of publication.

Original origami artwork: Mark Bolitho
Origami photography: Pearson Education Ltd/Naki Kouyioumtzis

Publication code: GQ000036

June 2023